CS102A Assignment 1 2021 fall

1 Integer sum

You are given $N(0 < N < 10^5)$ integers. The ith integer is denoted as $c_i(0 \leq c_i \leq 10)$. The problem is whether the sum of the all N integers is greater than or equal to $M(0 < M < 10^4)$. If that's true, you should print the amount that the sum exceeds M (the sum minus M). Otherwise, you should print a minus sign, followed by the amount that the sum is less than M (M minus the sum).

Input: The first line contains two integers N, M, where N is the number of integers, and M is just a integer. The second line contains N integers. The ith integer is c_i.

Output: The difference between the sum of c_i and M. If the sum of c_i is less than M, then add a minus sign in the front.

Sample Input 1:

```
5 10
5 4 3 2 1
```

Sample Output 1:

```
5
```

Sample Input 2:

```
10 30
2 2 2 2 2 2 2 2 2 2
```

Sample Output 2:

```
-10
```

Sample Input 3:

```
1 6
6
```

Sample Output 3:

```
0
```

hints: In the first sample, (5+4+3+2+1) is 15, 15 is great than 10, so print 15-10=5. In the second example 2+2+2+2+2+2+2+2+2+2=20, since 20 is less than 30, we shoulbe print a minus sign, followed by 30-20=10.

2 Real number average

You are given $N(0 < N \leq 20)$ integers, the ith number is denoted as $s_i(0 \leq s_i \leq 100)$. You are asked to calculate the average of all the **non-zero** numbers.

Input: The first line contains a integer N. It is the number of integers you will be given. The second line contains N integers. The ith integer is s_i.

Output: The average of all his non-zero integers, rounded to two decimal places after the decimal point.

Sample Input 1:

```
11
85 90 71 76 92 58 95 61 54 62 53
```

Sample Output 1:

```
72.45
```

Sample Input 2:

```
10
60 0 0 0 0 0 0 0 0 0
```

Sample Output 2:

```
60.00
```

3 Dealing with time

You are given two different time in a day, represented as hour($0 \leq$ hour ≤ 23) and minute($0 \leq$ minute ≤ 59). You are asked to calculte the difference between them.

The first time is always earlier than the second time.

Input: The input contains four integers, they are "hour of time 1", "minute of time 1", "hour of time 2", "minute of time 2".

Output: Output one integer, how many minutes the first time is earlier than the second time.

Sample Input 1:

```
11 59 12 0
```

Sample Output 1:

```
1
```

Sample Input 2:

```
13 30 17 20
```

Sample Output 2:

```
230
```

hints: In the first example, the first time is 11:59, the second time is 12:00, so they are differed by 1 minute.

4 Price of Books

You want to buy some books. You are given the price of N(0<N $\leq$ 10000) books, where p_i (0<p_i<10000) is the price for the ith book. You are asked to find the minimum and the maximum of the prices. Also figure out how many prime numbers are there in these two numbers.

Input: The first line contains one integer N, which is the number of books for him to choose. The second line contains N numbers, and the ith integer is p_i. Output: The first line is the minimum. The second line is the maximum. And the third line is the count of prime numbers in the minimum and maximum.

Sample Input1:

```
5
2 3 4 5 6
```

Sample Output1:

```
2
6
1
```

Sample Input2:

```
10
```

```
21 1 71 54 62 36 27 98 99 33
```

Sample Output2:

```
1
99
0
```

Hints: In the first sample, the minimum is 2 and the maximum is 6, and 2 is a prime number but 6 is not, so the third line is 1. In the second sample, the minimum is 1 and the maximum is 99, and they are not prime numbers, so the third line is 0.

A prime number is not divisible by all numbers except 1 and itself. You can use this property to test a prime number.

5 Hail conjecture

Let's play a game on integers. First begins with a integer N($1 \leq N \leq 1000$). Then do the following: if it is odd, multiply it by 3 and add 1. If it is even, divide it by 2.

Keep going, until it becomes 1. You are asked to calculate the max number in this process.

Input: The 1st line contains an integer T($1 \leq T \leq 1000$), representing the number of test cases. Then T lines follow. Each line contains an integer N as the begin number of the process.

Output: Output one integer for each test case, the max number in the process.

Sample Input:

```
2
6
8
```

Sample output:

```
16
8
```

Hint: For number 6 : the process is 6-3-10-5-16-8-4-2-1. The

max is 16. For number 8 : the process is 8-4-2-1. The max is 8.

6 Number conversion

You are given a integer $n(0 \leq n \leq 2147483647)$, print its binary form.

Input: The 1st line contains an integer $T(1 \leq T \leq 1000)$, the number of test cases. Next T lines, each line contains an integer n

Output: For each test case, print a line, print its binary form.

Sample input:

```
2
1
8
```

Sample output:

```
1
1000
```

Hint: The answer may be too long, you are supposed to print the answer as string. You can use '+' to combine strings.